ONTARIO MINISTRY OF ENVIRONMENT
3693600002448

OPERATING SUMMARY

PRESTON

water pollution control plant

1967

TD
367
.A56
P748
1967
MOE

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

TD
367
.A56
P748
1967

Preston : water pollution control plant.
81795

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Preston Local Advisory Committee,
Preston, Ontario.

Gentlemen:

We are happy to present you with the 1967 Operating Summary for the Preston Water Pollution Control Plant, OWRC Project No. 2-0046-59.

Your co-operation with our staff throughout the year has been appreciated. Only with such co-operation can the war against water pollution be waged effectively.

Yours very truly,

D. S. Caverly,
General Manager.

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ONTARIO WATER
RESOURCES COMMISSION

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ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

TELEPHONE 365-

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J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER
W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to submit to you the 1967 Operating Summary for the Preston Water Pollution Control Plant, OWRC Project No. 2-0046-59.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

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PRESTON

water pollution control plant

operated for

THE TOWN OF PRESTON

by the

ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: B. W. Hansler

801 Bay Street Toronto 5

'67 REVIEW

A total of 421.181 million gallons of sewage was treated during the year at a total operating cost of $50,152.64. The operating costs per lb. of BOD removed has remained constant at $0.03 since 1965.

The average daily flow during the year was 1.154 million gallons which represents an increase of 25.1 percent compared to the average daily flow of 0.923 million gallons in 1966. During the year the plant produced a BOD and suspended solids concentration with average reductions of 96.8 percent and 98.1 percent respectively. The average effluent BOD and suspended solids concentrations were 12.9 ppm and 14 ppm respectively.

The average organic loading on the plant of 5,230 lbs. was 97 percent of the design organic BOD loading of 5400 lbs. The average suspended solids of 7900 lbs. per day was 125 percent of the design suspended solids loading per day of 6300 lbs.

Difficulties were experienced with the operation of the aeration section during the months of November and December resulting in a poorer effluent than normal being discharged from the plant.

Under the supervision of head office engineers, the plant staff operated a clean, attractive and efficient plant for the Town of Preston.

PROJECT COSTS

STAGE 1

NET CAPITAL COST (Estimated) Long Term Debt to OWRC	$147,617.75
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	$ 25,128.07
Net Operating	$ -
Debt Retirement	2,979.00
Reserve	737.28
Interest Charged	8,324.65
TOTAL	$ 12,040.93

RESERVE ACCOUNT

Balance at January 1, 1967	$ 7,126.91
Deposited by Municipality	737.28
Interest Earned	420.30
	$ 8,284.49
Less Expenditures	-
Balance at December 31, 1966	$ 8,284.49

STAGE 2

NET CAPITAL COST (Estimated)	$647,993.44
DEDUCT - Portion Financed by CMHC (Estimated)	432,072.28
Long Term Debt to OWRC	$215,921.16
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	$ 23,932.43
Net Operating	$ 50,152.64
Debt Retirement	4,357.00
Reserve	3,933.08
Interest Charged	12,176.55
TOTAL	$ 70,619.27

RESERVE ACCOUNT

Balance at January 1, 1967	$ 12,299.63
Deposited by Municipality	3,933.08
Interest Earned	757.74
	$ 16,990.45
Less Expenditures	(735.41)
Balance at December 31, 1966	$ 16,255.04

BILLINGS - BOTH PROJECTS

	STAGE I	STAGE II	TOTAL
Net Operating	-	$50,152.64	$50,152.64
Debt Retirement	$ 2,979.00	4,357.00	7,336.00
Reserve	737.28	3,933.08	4,670.36
Interest Charged	8,324.65	12,176.55	20,501.20
TOTAL	$12,040.93	$70,619.27	$82,660.20

RESERVE ACCOUNT - BOTH PROJECTS

	STAGE I	STAGE II	TOTAL
Balance at Jan. 1, 1967	$7,126.91	$12,299.63	$19,426.54
Deposited by Municipality	737.28	3,933.08	4,670.36
Interest Earned	420.30	757.74	1,178.04
	$8,284.49	$16,990.45	$25,274.94
Less Expenditures	-	735.41	735.41
Balance at Dec. 31, 1967	$8,284.49	$16,225.04	$24,539.53

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	1880.65	1336.35	100.98	439.51	(108.00)			94.75	17.06	
FEB	2563.76	1325.45	90.14	464.64	247.96	35.67			399.90	
MARCH	3451.59	2142.78	114.20	451.47	247.96	85.37	69.61	129.08	156.59	54.53
APRIL	4850.71	1385.20	84.20	442.32	1109.85	46.80	19.60	40.71	1722.03	
MAY	3550.01	1568.60	57.47	354.36	(80.85)	258.76		88.79	1248.75	54.13
JUNE	4995.18	1401.32		377.19		172.75		236.03	2807.89	
JULY	4276.96	1641.69		351.62		92.84		342.36	1794.32	54.13
AUG	5177.12	1780.69		359.85	1567.19	87.94			1381.45	
SEPT	4557.90	2866.22		376.09		39.24	125.37	112.63	984.62	53.73
OCT	4875.76	1871.56		377.17	1415.77	200.35		25.93	984.98	
NOV	3509.50	1881.46			247.96	72.48		5.00	1248.87	53.73
DEC	6463.50	1857.64		818.27	1375.24	228.31		245.92	1938.12	
TOTAL	50152.64	21058.96	446.99	4812.49	6023.08	1320.51	214.58	1321.20	14684.58	270.25

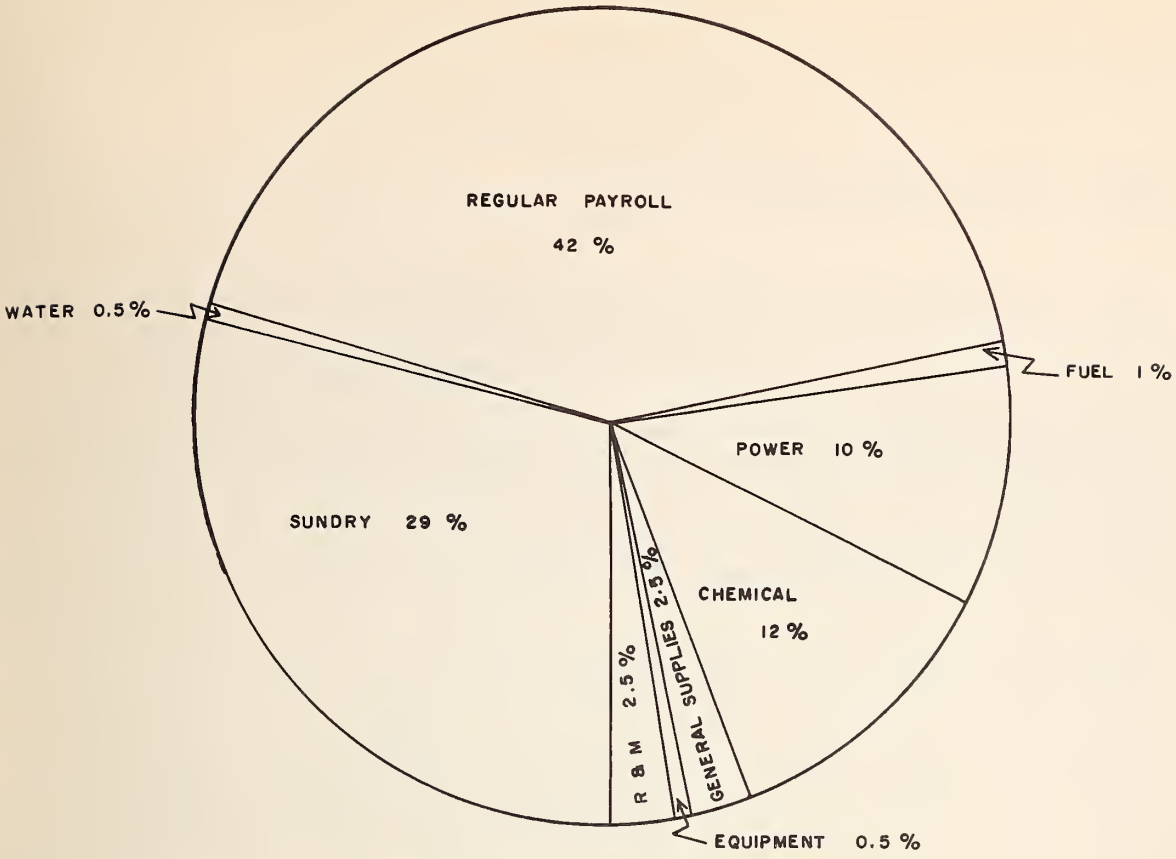
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $10,357.75

BRACKETS INDICATE CREDIT

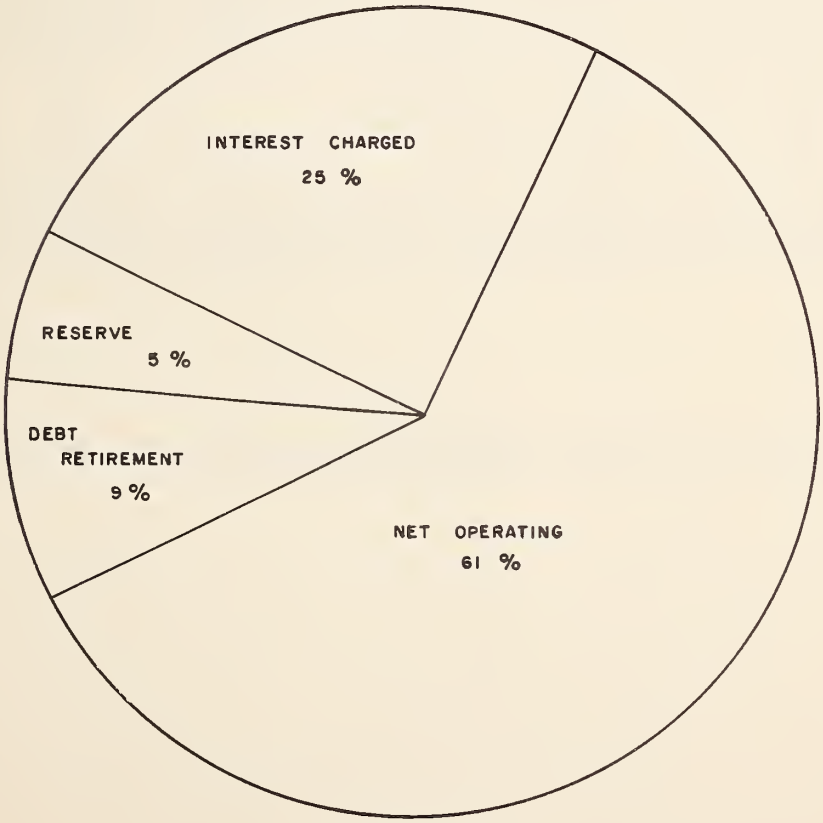
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1963	284.127	$30,651.00	$108.00	2½ CENTS
1964	284.326	30,649.67	107.80	2½ CENTS
1965	326.714	36,292.57	111.08	3 CENTS
1966	336.947	43,359.79	128.68	3 CENTS
1967	421.181	50,152.64	119.08	3 CENTS

1967 OPERATING COSTS



TOTAL ANNUAL COST



VACUUM FILTER COSTS (MONTHLY)

MONTH	COST PER MONTH					TOTAL	COST PER TON DRY WEIGHT					TOTAL
	$FeCl_3$	LIME	LABOUR	ELEC	MAINT		$FeCl_3$	LIME	LABOUR	ELEC	MAINT	
JANUARY	395.51	250.90	418.01	73.60	262.26	1400.28	5.48	3.48	5.79	1.02	3.63	19.40
FEBRUARY	398.23	216.74	382.54	75.64	240.01	1313.16	5.37	2.92	5.16	1.02	3.24	17.71
MARCH	211.17	107.09	172.27	36.08	108.08	634.69	5.97	3.03	4.87	1.02	3.05	17.94
APRIL												
MAY												
JUNE												
JULY												
AUGUST	149.78	79.55	159.61	32.56	100.14	521.64	4.69	2.49	5.00	1.02	3.14	16.34
SEPTEMBER	293.54	221.32	347.08	67.93	217.76	1147.63	4.41	3.32	5.21	1.02	3.27	17.23
OCTOBER	260.55	241.72	367.34	71.30	230.47	1171.38	3.73	3.46	5.26	1.02	3.30	16.77
NOVEMBER	259.95	223.85	349.61	74.55	219.35	1127.31	3.56	3.06	4.78	1.02	3.00	15.42
DECEMBER	223.44	190.23	336.94	95.54	211.40	1057.55	2.39	2.03	3.60	1.02	2.26	11.30
TOTAL	2192.17	1531.40	2530.40	527.20	1589.47*	8373.64						
AVERAGE PER MONTH	274.02	191.42	316.67	65.90	196.68	1046.70	4.45	2.97	4.96	1.02	3.11	16.51

* MAINTENANCE INCLUDES COSTS ASSOCIATED WITH FIRST MAJOR RECONDITIONING OF FILTER.

COMMENTS

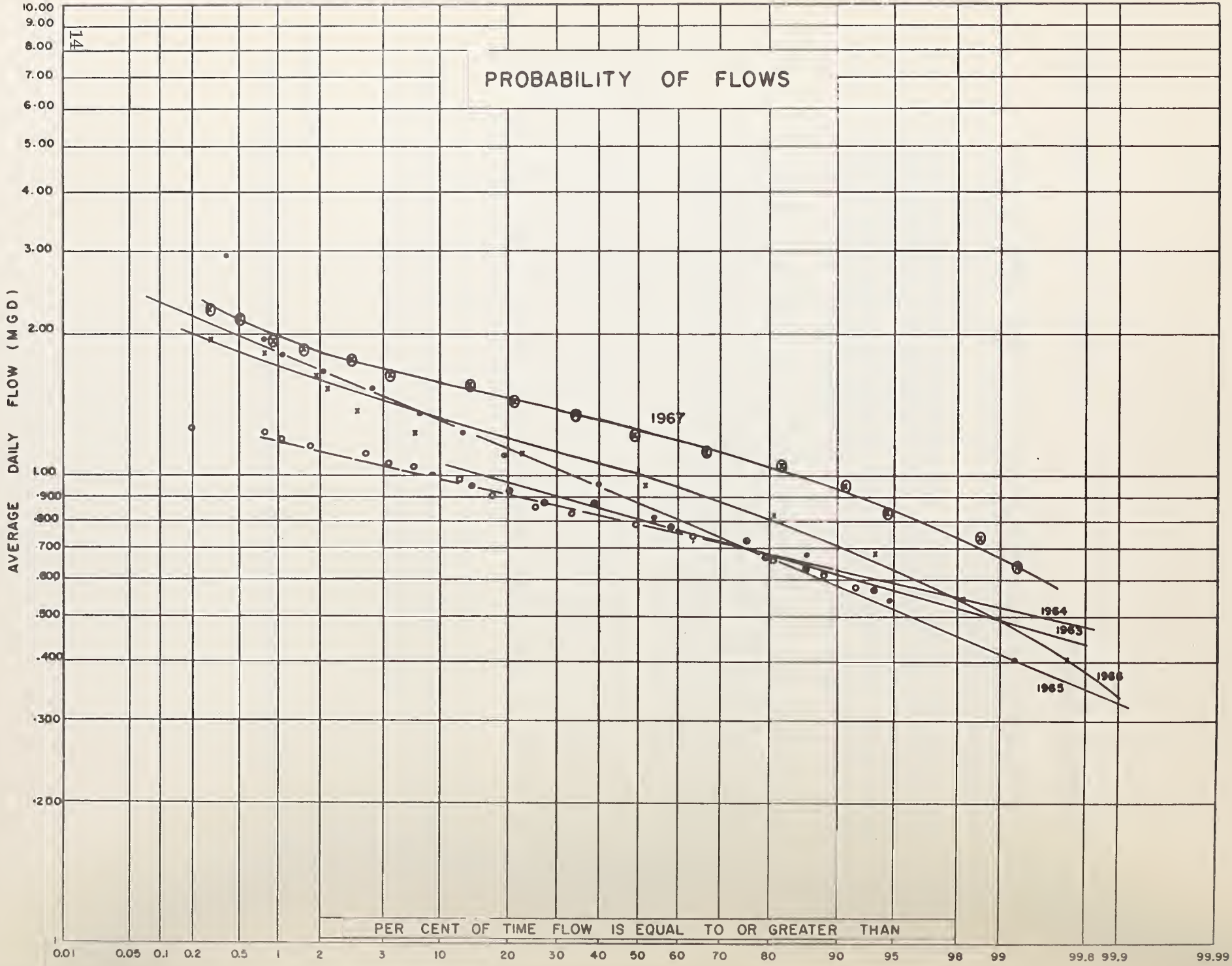
The average cost per ton dry weight to operate the vacuum filter was $16.51.

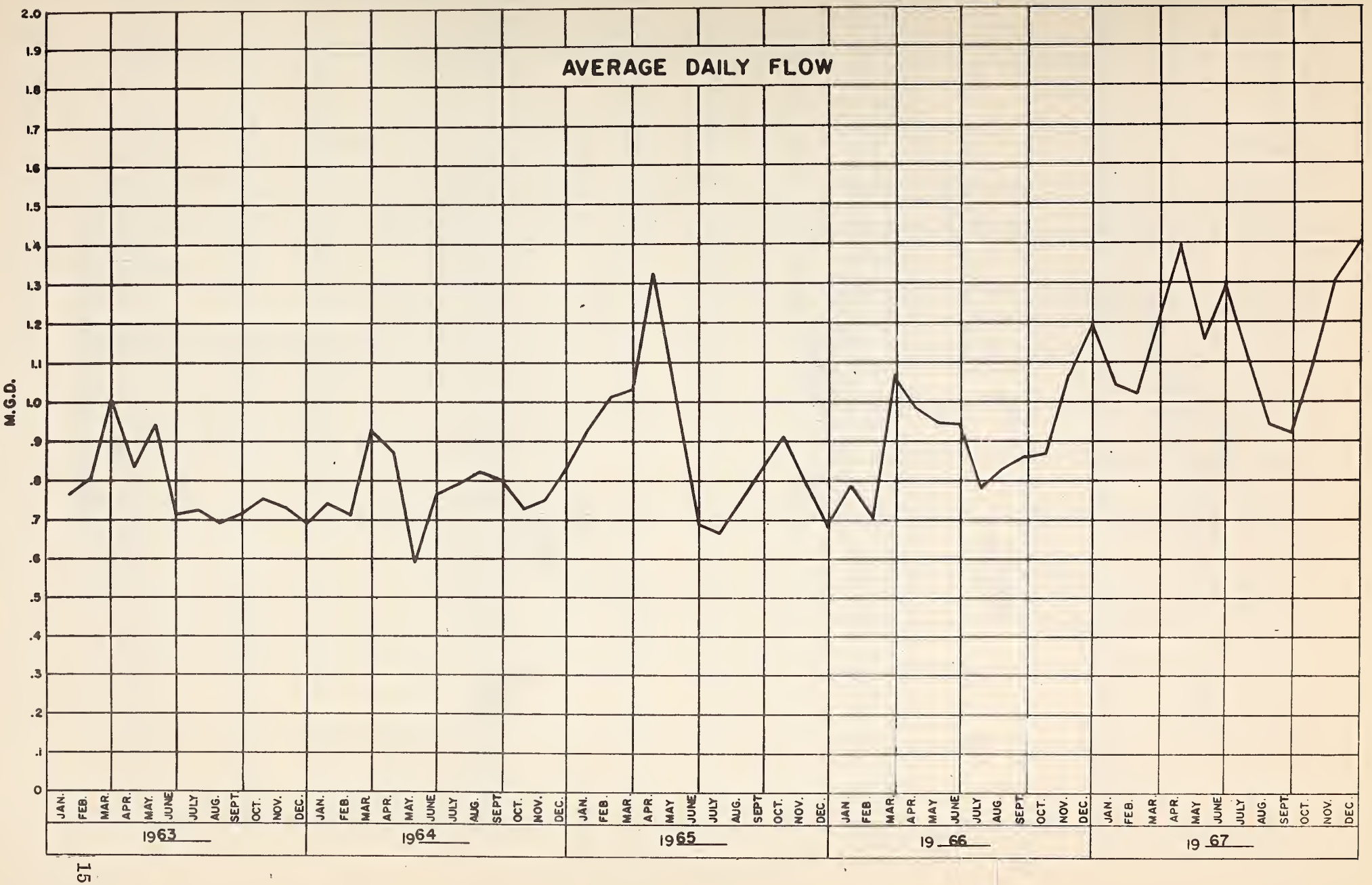
Process Data

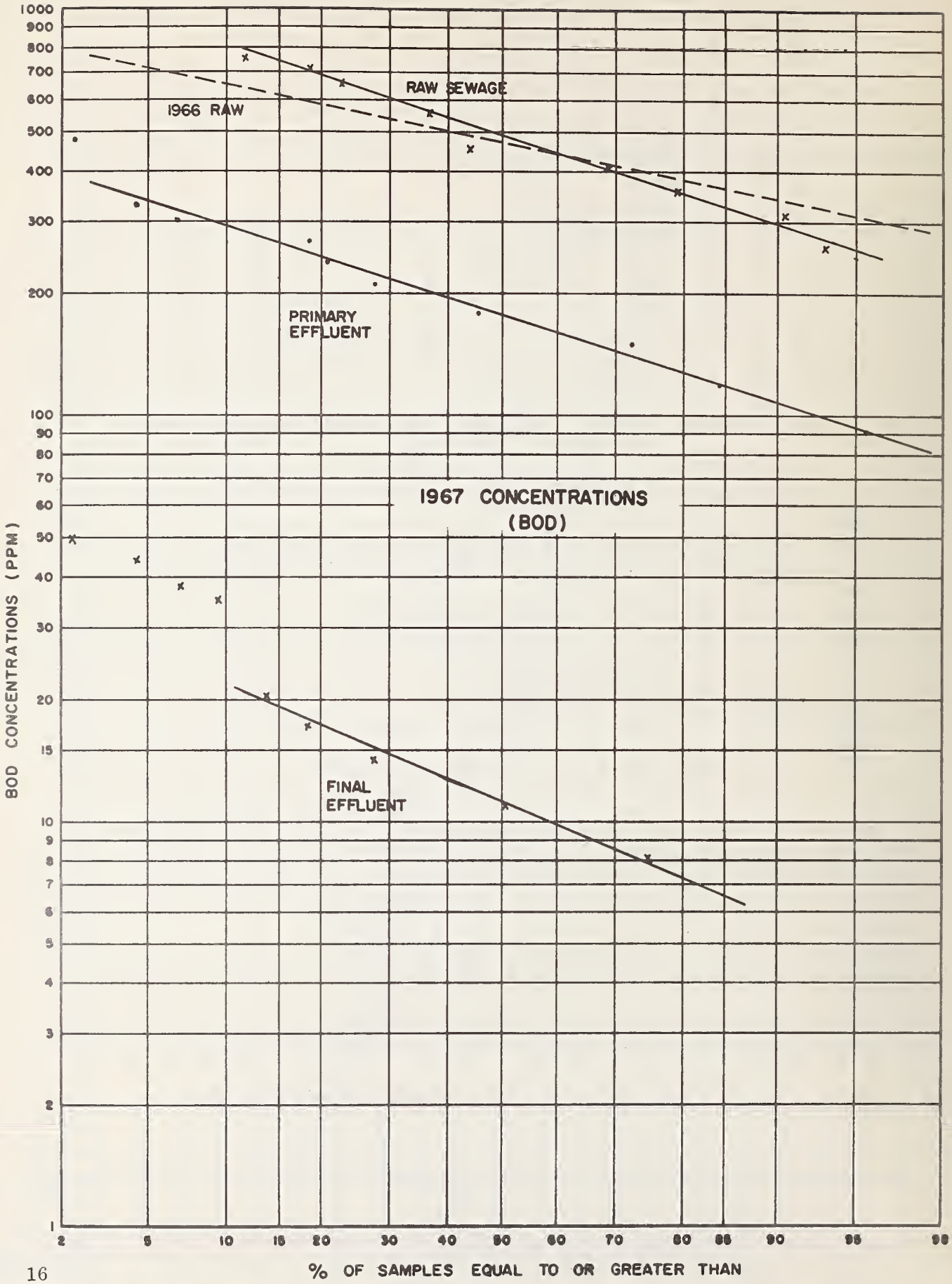
The average daily flow during the year was 1.154 million gallons, 53.9 percent of the design flow of 1.8 million gallons per day. The design flow was exceeded 2 percent of the time.

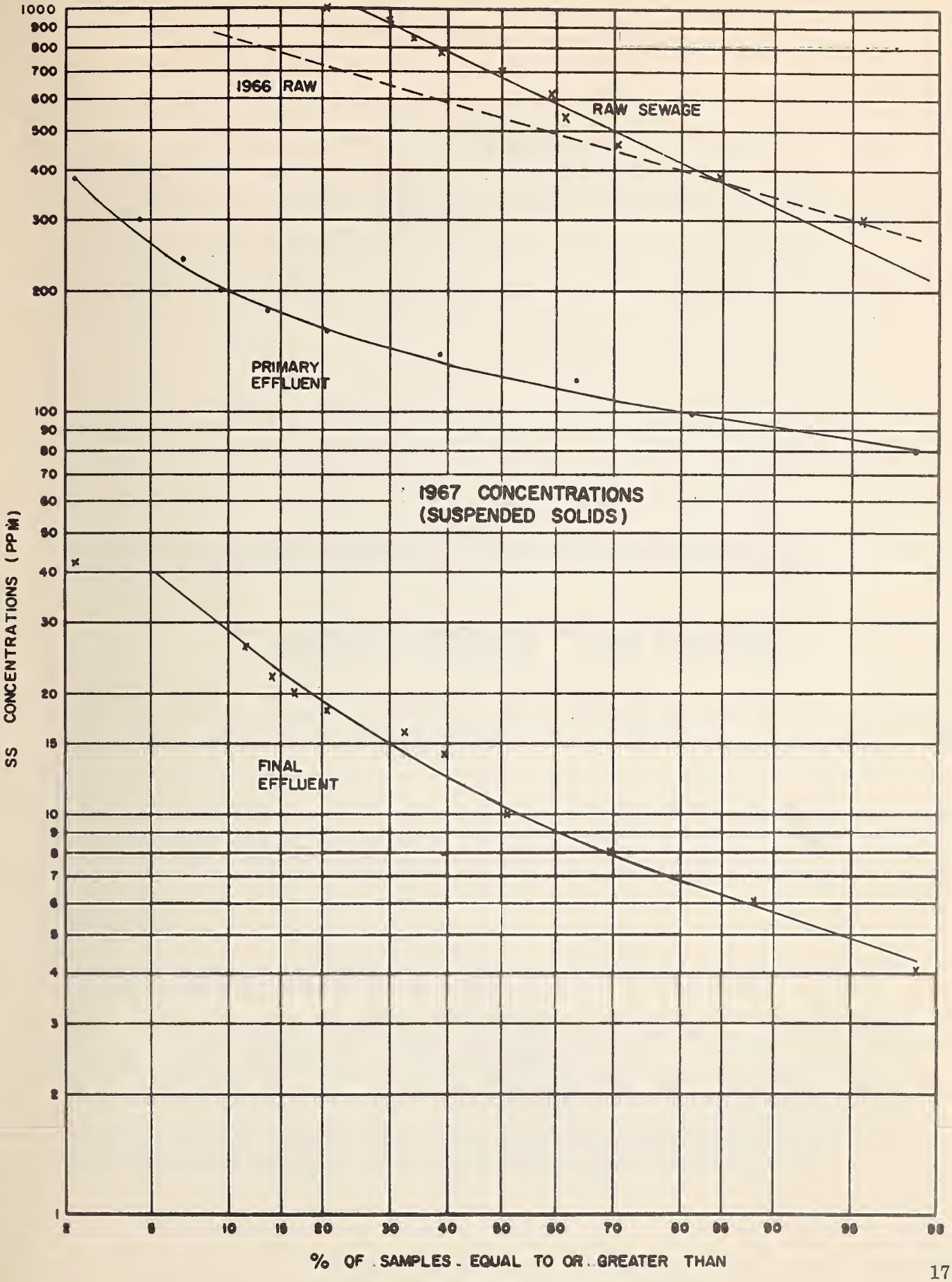
The average raw sewage BOD and suspended solids concentrations were 455 ppm and 686 ppm respectively. The raw sewage BOD concentrations exceeded the design value of 300 ppm by 51.6 percent. The average suspended solids concentration of 686 ppm exceeded the design value of 350 ppm by 96.0 percent. The total organic BOD and suspended solids loadings were 97 percent and 125 percent of the design values.

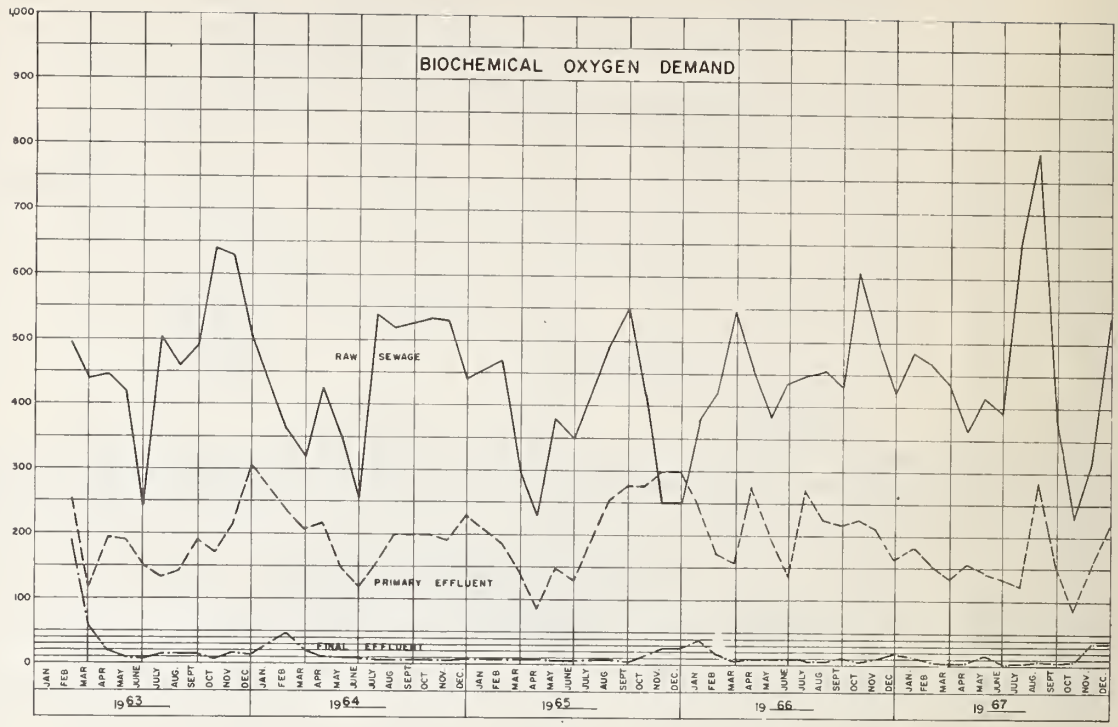
The average effluent BOD and suspended solids concentrations were 12.9 ppm and 14 ppm respectively. Difficulties with the aeration section caused a deterioration in the effluent during the months of November and December. The effluent BOD exceeded the OWRC objective of 15 ppm 28 percent of the time. The effluent suspended solids exceeded the Commission objective of 15 ppm 30 percent of the time.


PROBABILITY OF FLOWS
AVERAGE DAILY FLOW (MGD)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
.900
.800
.700
.600
.500
.400
.300
.200
1967
1964
1963
1966
1965
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

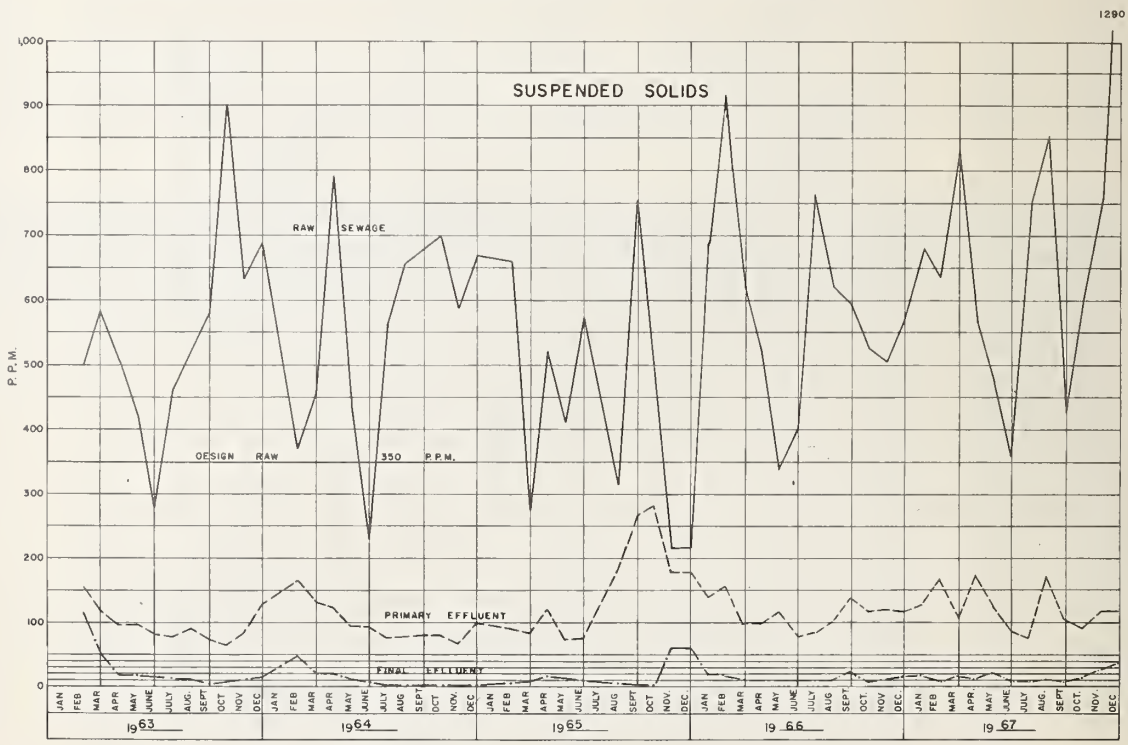

AVERAGE DAILY FLOW
M.G.D.
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1963
1964
1965
19 66
19 67


1967 CONCENTRATIONS
(BOD)
RAW SEWAGE
1966 RAW
PRIMARY
EFFLUENT
FINAL
EFFLUENT
BOD CONCENTRATIONS (PPM)
% OF SAMPLES EQUAL TO OR GREATER THAN
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98


1966 RAW
RAW SEWAGE
PRIMARY EFFLUENT
1967 CONCENTRATIONS (SUSPENDED SOLIDS)
FINAL EFFLUENT
SS CONCENTRATIONS (PPM)
% OF SAMPLES EQUAL TO OR GREATER THAN



MONTHLY VARIATIONS



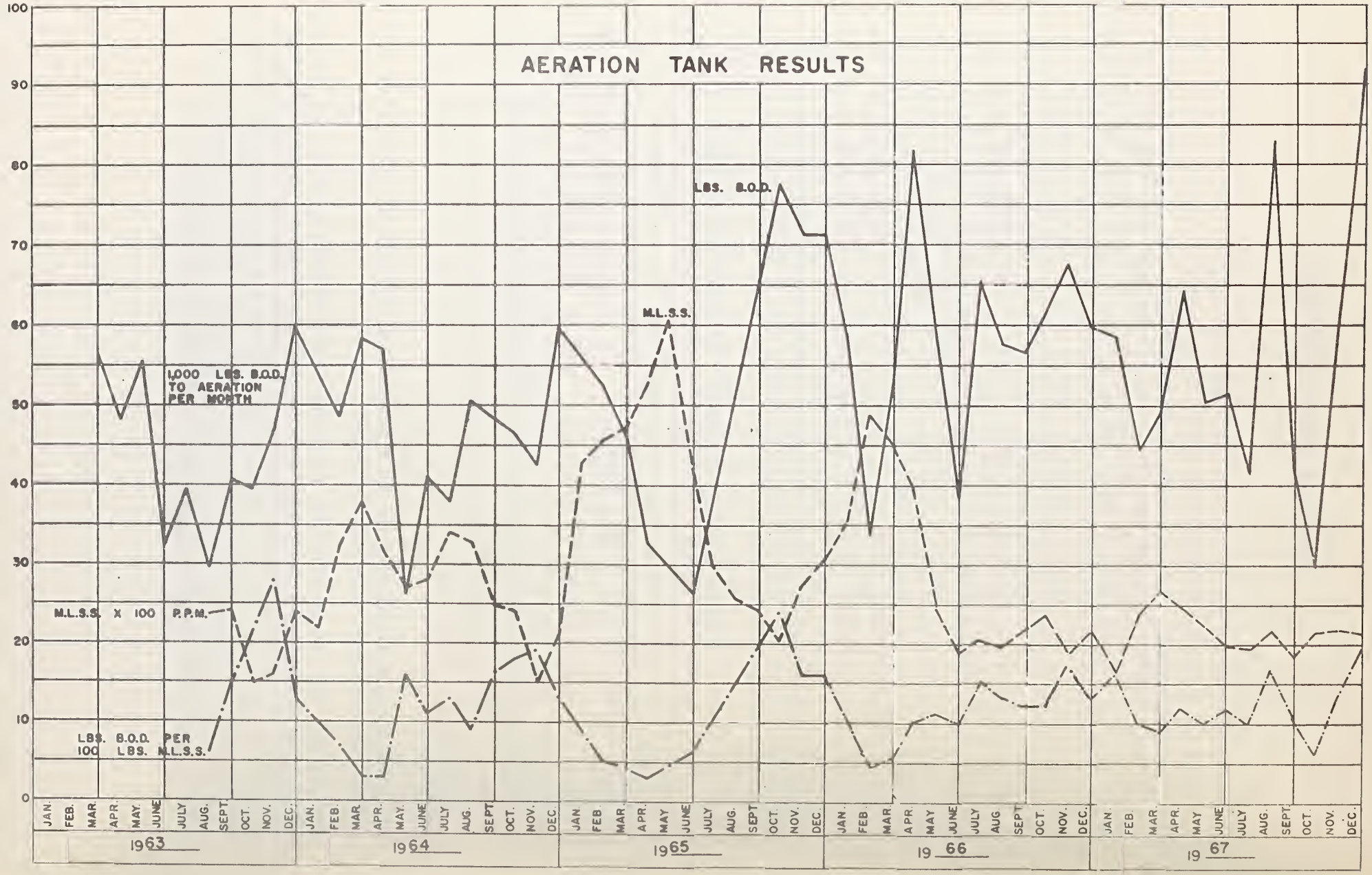
GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	482	14.8	96.9	75.28	680	13	98.1	107.48	22
FEB.	469	9	98.1	65.02	638	7	98.9	89.20	18
MAR.	437	7.3	98.3	80.30	840	13	98.4	154.54	16
APR.	362	7.7	97.9	72.22	569	10	98.2	113.95	20
MAY	417	16	96.2	71.40	471	20	95.8	80.30	14
JUNE	390	4	99.0	74.56	348	8	97.7	65.68	20
JULY	652	3.9	99.4	111.89	755	6	99.2	129.31	22
AUG.	793	8.2	99.0	114.01	859	10	98.8	123.34	14
SEPT.	389	7	98.2	52.15	429	7	98.4	57.61	48
OCT.	226	7.8	96.5	37.07	604	13	97.8	100.40	29
NOV.	312	34	89.1	54.27	760	23	97.0	143.89	57
DEC.	535	35	93.4	108.47	1290	35	98.4	275.51	113
TOTAL	-	-	-	916.64	-	-	-	1441.21	393
AVG.	455	12.9	96.8	76.39	686	14	98.1	120.10	33

COMMENTS

The average percent reductions of 96.8 percent for BOD and 98.1 percent for suspended solids indicate excellent treatment.

The average raw sewage BOD and suspended solids concentrations of 455 ppm and 686 ppm respectively represent very heavy organic loadings and the effective reduction experienced at the plant can be attributed to excellent control of plant operations. This fact is reflected in the average final effluent BOD and suspended solids concentrations of 12.9 ppm and 14 ppm respectively which were below the OWRC objective of 15 ppm for each. However, due to difficulties with the aeration section, the treatment efficiency decreased in the months of November and December.


AERATION TANK RESULTS
LBS. B.O.D.
M.L.S.S.
1,000 LBS. B.O.D. TO AERATION PER MONTH
M.L.S.S. X 100 P.P.M.
LBS. B.O.D. PER 100 LBS. M.L.S.S.
100
90
80
70
60
50
40
30
20
10
0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1963
1964
1965
1966
1967

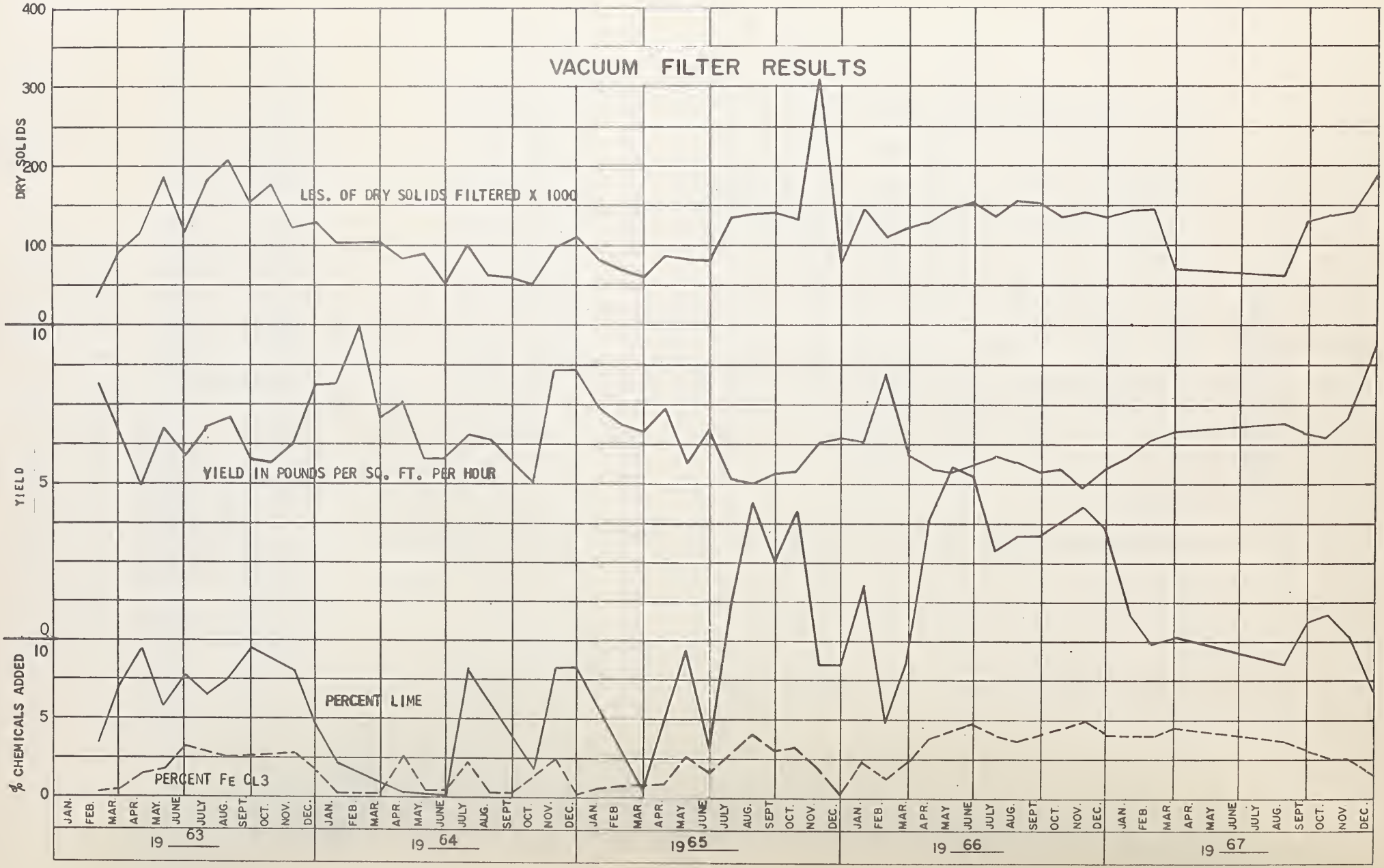
AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. BOD. PER 100 LBS. M. L. S. S.
JANUARY	181	1692	16
FEBRUARY	156	2362	10
MARCH	133	2666	9
APRIL	159	2467	12
MAY	141	2207	10
JUNE	134	1997	12
JULY	121	1956	10
AUGUST	286	2177	17
SEPTEMBER	156	1889	11
OCTOBER	86	2140	6
NOVEMBER	159	2171	13
DECEMBER	212	2168	19
TOTAL	-	-	-
AVERAGE	160	2158	12

COMMENTS

The organic loading on the aeration section averaged 12 lbs. of BOD per 100 lbs. of MLSS. This average loading ratio is in the low range of the accepted loading limits. However, it is necessary in that it provides a margin of safety against upsets caused by shock organic loadings.

The raw sewage BOD averaged 455 ppm. The primary effluent BOD average 160 ppm. This represents a primary clarifier reduction efficiency of 64.8 percent which is excellent for primary clarification.


VACUUM FILTER RESULTS
DRY SOLIDS
400
300
200
100
0
LBS. OF DRY SOLIDS FILTERED X 1000
YIELD
10
5
0
YIELD IN POUNDS PER SQ. FT. PER HOUR
% CHEMICALS ADDED
10
5
0
PERCENT LIME
PERCENT Fe Cl3
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 63
19 64
19 65
19 66
19 67

VACUUM FILTER OPERATION

MONTH	% SOLIDS FILTRATE	FILTER HOURS	% SOLIDS SLUDGE	LBS. DRY SOLIDS FILTERED	LBS. LIME (AS CAO)	% LIME (AS CAO)	LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
JAN.	0.25	99.50	6.6	144322	17220	11.9	6113	4.2	20.2	5.8
FEB.	0.24	91.50	6.9	148309	14875	10.0	6203	4.2	20.3	6.3
MAR.	0.28	41.25	6.9	70754	7350	10.4	3263	4.6	20.6	6.6
APR.	O/S	*								
MAY.	O/S	*								
JUNE	O/S	*								
JULY	O/S	*								
AUG.	1.36	38.00	7.4	63850	5460	8.6	2355	3.7	20.3	6.8
SEPT.	1.62	82.75	8.1	133197	15190	11.4	4537	3.4	19.5	6.5
OCT.	1.20	87.75	7.4	139805	16590	11.9	4027	2.9	20.9	6.4
NOV.	1.30	83.75	8.1	146174	15365	10.5	4049	2.8	21.2	7.0
DEC.	1.40	80.25	13.0	187329	13055	7.0	3427	1.8	27.0	9.3
TOTAL		604.75		1033740	105105		33974			
AVG.	9.6	75.59	8.0	129218	13138	10.2	4247	3.3	21.2	6.8

* FILTER OUT OF SERVICE APRIL THROUGH JULY

COMMENTS

The vacuum filter yield increased from 5.8 lbs. per sq. ft. per hour in 1966 to an average of 6.8 lbs. per sq. ft. per hr. in 1967. This represents a 17.3 percent increase in filter yield. One of the major contributing factors to this added filter yield was the increase in percent solids to the vacuum filter from an average of 6.3 percent in 1966 to an average of 8.0 percent in 1967.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	32.227	1996	6.19
FEBRUARY	28.271	1786	6.31
MARCH	37.374	2164	5.79
APRIL	41.770	2184	5.23
MAY	35.609	2248	6.31
JUNE	38.633	2012	5.21
JULY	34.529	2150	6.22
AUGUST	29.056	1696	5.83
SEPTEMBER	27.302	1795	6.57
OCTOBER	33.976	1965	5.78
NOVEMBER	39.047	1955	5.00
DECEMBER	43.387	1590	3.67
TOTAL	421.181	23541	-
AVERAGE	35.098	1962	5.68

COMMENTS

An average dosage rate of 5.68 ppm was sufficient to maintain an average chlorine residual of 0.5 ppm during 1967.

CONCLUSIONS

The average BOD and suspended solids reduction efficiencies were 96.8 percent and 98.1 percent respectively. The average daily flow during the year was 1.154 million gallons per day. The total organic BOD and suspended solids loadings were 97 percent and 125 percent respectively of the design loadings for each.

The very high average raw sewage BOD and suspended solids concentrations of 455 ppm and 686 ppm respectively are indicative of the discharge of a very concentrated organic industrial waste in the municipal sewerage system.

RECOMMENDATIONS

It is recommended that the Town of Preston pass an industrial waste by-law in order to control the organic content of industrial wastes being discharged into the municipal sewerage system.

ONTARIO WATER RESOURCES COMMISSION